A STUDY ON THE EFFECTIVENESS OF FASCIAL MANIPULATION IN REDUCING PAIN AND IMPROVING WRIST FUNCTION FOLLOWING TFCC STRAIN AMONG ATHLETES.

A dissertation submitted in partial fulfillment of the requirement for the degree of

MASTER OF PHYSIOTHERAPY

(Elective- Physiotherapy in Sports)

To

The Tamil Nadu Dr. M.G.R. Medical University

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May 2019

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A STUDY ON THE EFFECTIVENESS OF FASCIAL MANIPULATION IN REDUCING PAIN AND IMPROVING WRIST FUNCTION FOLLOWING TFCC STRAIN AMONG ATHLETES.

INTERNAL EXAMINER:

EXTERNAL EXAMINER:

A dissertation submitted in partial fulfillment of the requirement for the degree of **Masterof Physiotherapy – May 2019** to the Tamil Nadu DR. M.G.R. Medical University, Chennai.

ACKNOWLEDGEMENT

I, the investigator of this study thank the Lord Almighty for abundant blessings throughout this study.

I respect and thank the **Chairman, Managing Trustee**And**Secretary** of R.V.S Educational Trust, Sulur, Coimbatore, for providing me an opportunity to do this project.

I owe my profound gratitude to our Principal **Dr. R. Nagarani, MPT, MA, Ph.D**., for providing support and guidance in the form of resources and inputs.

I would like to thank my guide**Mr.G.S.Thirumoorthy.,** for guiding me entirely through the course of my thesis work.I would also like to thank all other staff members **Dr. Franklin Shaju MPT., Ph.D ., Mr. Gerald Edwin Raj MPT., Mrs. Catherine MPT ., Mrs. Seema MPT., Mrs. Dhiya J Pawani MPT., Mrs.. Mahalakshmi MPT.,** for their timely support.

I wish to express my deep sense of gratitude to my Role model, Inspiration and Mentor **Dr. B .Kannabiran MPT., Ph.D.,** for his timely help and support for the completion of this project. The knowledge he has imparted on me is the greatest assest in my career to reach new heights.

I am thankful and fortunate enough to get constant support, encouragement and guidance from my parents **Mr.Loganathan.K.P, Mrs. Vasantha.L**and my brother **Mr.ManikandaPrabhu.L.** I extend my gratitude to my guardians **Dr. Geetha Ninan, Dr. Anand Ninan**and their daughters **Dr. Reshmi Leila Ninan**and **Nisha Rachel Ninan**

A special thanks to **Mrs. L .Reshma**, The secret of my Positivity, My motivator, My guiding Light And My Biggest strength.

My heartfelt thanks to my best friend**Ms.Daisee Jenny,** who has been with me through thick and thin in my life, and gratitude to **Mrs. Muthu Ramesh** and all otherswho supported and helped towards the completion of this project.

ANANDA GEETHA.L

DECLARATION

I hereby declare and present my thesis work titled **"A STUDY ON THE EFFECTIVENESS OF FASCIAL MANIPULATION IN REDUCING PAIN AND IMPROVING WRIST FUNCTION FOLLOWING TFCC STRAIN AMONG ATHLETES "**

The outcome of the original research work under taken and carried out by me, under the guidance of **Mr.G.S. Thirumorthy MPT., RVS College of Physiotherapy,** Sulur, Coimbatore. I also declare that the material of this project work has not formed in anyway the basis for the award of any other degree previously from the Tamil Nadu Dr. M.G.R Medical University.

Date: Signature

Place: (ANANDA GEETHA.L)

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Introduction

CHAPTER – 1

INTRODUCTION

Mild injuries of the Triangular fibrocartilage Complex (TFCC) is referred to as TFCC strain which may be caused either by degeneration / overuse / disuse**(Usama Talib *et al.*,2004).**

The Triangular Fibrocartilage Complex located at the ulnar side of the wrist. It is formed by the Triangular fibrocartilage Disc, The radio-ulnar ligaments and the ulno-carpal ligaments.The Triangular Fibrocartilage disc is an articular disc which is triangular and biconcave lying on the pole of distal ulna. This disc is attached by thick tissue to the base of the ulnar styloid process and by thinner tissue to the edge of radius just proximal to the radio-carpal articular surface.The Radio-ulnar Ligaments are the principle stabilizers of the distal radio-ulnar joint. There are two Radio-ulnar Ligaments, the palmar and dorsal Radio-ulnar Ligament's. These ligaments arise from the distal radius medial border and insert on the ulna at two separate and distinct sites – the ulnar styloid process and the fovea. TheUlno-carpal Ligaments consists of the ulno-lunate and ulno-triquetral ligaments. They originate from the ulnar styloid process and insert into the carpal bones : the ulno-lunate inserts into the lunate bone and the ulno-triquetral inserts into the triquetrum bone **(Palmer and Verner 1981).**

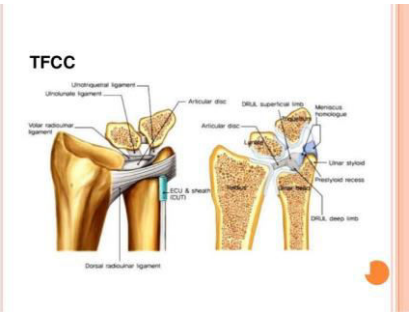


Figure 1 TFCC Anatomy

The cause for TFCC strain include

- A direct blow to the side of the wrist or hand.
- Repetitive pronation and gripping with load or force through the wrist.
- A fall onto an outstretched hand.
- Swinging a bat or racquet.
- A violent twist of the wrist.
- Positive Ulnar Variance

High – demand athletes such as tennis players or gymnasts (including children and teens) are at a greatest risk for TFCC injuries. TFCC injuries in children and adults occur more often after an ulnar styloid fracture that doesn't heal.Degenerative tears are more common in people over 50 years of age.

Symptoms include pain in the ulnar side of the wrist or little finger, swelling, worsening pain when the wrist is bent side-to-side, loss of strength to the hand and wrist.

Diagnosis

TFCC strain or tear are diagnosed through carefulexamination of the wrist. An X-ray may be performed to check for fractures and other abnormalities. The most reliable imaging test is an MRI which allows the doctors to inspect the tissueand cartilage to see the extent of the injury.

Special Test

TFCC Compressiontest : Reproduction of pain / clicking with ulnar deviation of the wrist with forearm in neutral.**(David Magee)**

Treatment

The treatment for TFCC Strain depends on the stage of severity.

Non-surgical treatment option includes the follows

- Splint/cast
- Anti-inflammatory medication
- Cortisone injection
- Ultrasound therapy

Surgery is required only when the tears don't heal or when there is no response to the conservative treatment

1.1 Statement of the study

A study on the effectiveness of Fascial manipulation in reducing pain and improving wristfunction following TFCC Strain among athletes.

1.2 Need of the study

The need for this study is to introduce fascial manipulation as an effective treatment in reducing pain and improving functional performance following TFCC Strain among athletes.

1.3 Objective of the study

To find out the effects of fascial manipulation in reducing pain and improving wrist function following TFCC strain among athletes.

1.4 Hypothesis

The following hypothesis were framed out for this study

- There may be a significant difference in pain following fascial manipulation in TFCC strain
- There may be a significant difference in functional performance following fascial manipulation in TFCC strain

- There may not be a significant difference in pain and functional performance following fascial manipulation in TFCC strain

1.5 Operational definition

Pain

Pain is an unpleasant experience that involves the conscious awareness of noxious sensation, hurting and aversive feeling associated with actual or potential tissue damage (**Melzack 1999).**

TFCC strain

Mild injuries of the Triangular fibrocartilage Complex (TFCC) is referred to as TFCC strain which may be caused either by degeneration / overuse / disuse

Fascial Manipulation

Fascial Manipulation is a manual technique, the aim of which is to restore normal fluidity to the ground substance and to eliminate adherences between collagen fibers by exploiting the malleability of the fascia **(Luigi Stecco2004)**

Review of Literature

CHAPTER – II

REVIEW OF LITREATURE

Section A : Studies related to Triangular Fibro Cartilage Complex

Section B: Studies on the effectiveness of Fascial manipulation in treating Musculoskeletal pain.

Section C: Studies on the Reliability Validity of Visual Analogue Scale.

Section D : Studies on the Reliability and Validity of Patient – Rated Wrist Evaluation.

Section A : Studies related to Triangular Fibro Cartilage Complex

Usama Talib *et al*., (2015) conducted a study on Triangular fibrocartilage injury among professional cricketers to create an awareness of this common site of injury. Patients presenting with wrist pain radiating to the ulnar side were included in the study. The player was advised to use wrist support and complete hand rest for two weeks. A through examination was performed on subsequent follow-up. The player returned to play without any discomfort or pain ever since. Although rare, but once diagnosis is made, immediate therapy should be initiated with gradual and planned rehabilitation to ensure complete recovery.

Duretti T. Fufa *et al.,*(2012) conducted a study on sports injuries involving the hand and wrist and provided areview of athletic injuries to the wrist with particular focus on physicalevaluation and management of the most common and challenging fractures and soft tissue injuries of the wrist. Wrist injuries are common in athletes and

can result from either trauma or repetitive injury. For the clinician performing initial evaluation, knowledge of the most common injuries and directed physical examination aid in early diagnosis and treatment.

Section B :Studies on the effectiveness of fascial manipulation in treating musculoskeletal pain

Kannabiran *et al.,* (2016) conducted a study to find out the effectiveness of Fascial manipulation in Carpal tunnel syndrome patients. The treatment was effective in reducing pain among CTS patients and thereby improve functional work of wrist and hand. The treatment assumed to help alteration of Fascial viscosity.

Ercole *et al*., (2010) conducted a study to see the time required to modify an apparent fascial fibrosis difference in accordance with the site and differences in chararcterestics of subjects and symptoms. In particular, the difference in the time to halve the pain level between sub-acute and chronic patients, the difference between the specific small areas that were treated was statistically significant.

Alessandro Pedrelli *et al.,* (2008) did a study in treating Patellar tendinopathy with Fascial Manipulation. This study included 18 subjects suffering from Patellar tendon pain and were treated with Fascial manipulation. They concluded that the results showed a substantial decrease in pain.

Antonio Stecco *et al*., (2004) conducted a randomized control trial to compare the effectiveness of Fascial manipulation and Low-Level laser therapy for CTS. The patients were randomly assigned to receive multiple sessions of FM or multiple sessions

of LLT. The group that received FM showed a significant reduction in subjective pain perception and an increased function assessed by BCTQ at the end of the treatment and follow-up. The group that received LLLT showed an improvement in the BCTQ at the end of the treatment but the improvement level was not sustained at the three month follow-up. FM is a valid alternative treatment for CTS.

Section C : Studies on the reliability and validity of Visual Analogue Scale

Preuper *et al.,* (2008) did a study on 52 patients in the reliability and validity of VAS for disability in patients with chronic musculoskeletal pain the conclusion of the study was that the reliability of the VAS for disability is moderate to good. Because of a weak correlation with other disability instruments and a strong correlation with the VAS for pain

Crossley *et al.,*(2004) speculated that the reliability and validity of visual analogue scale in musculoskeletal pain in 41 patients. It was concluded from the study that VAS is used for the heterogeneous assessment of musculoskeletal pain...

Brevik *et al.,*(2000), conducted a program to find out the validation of visual scale measurement for chronic and experimental pain, and they concluded that VAS sensory intensity response to experimental pain and VAS provides the patient to choose a number that best corresponds to level of pain he or she is experiencing.

Price *et al*., (1983) conducted a study to determine the reliability and validity of VAS in chronic musculoskeletal pain aged over 18 years. The study population consists of 52 patients in reliability study and 344 patients in validity. It was concluded from the study that the validity of VAS was moderate to good and its reliability was questionable

Bush *et al.*,(1994), this article supported that 10 cm horizontal lineon which the patients mark where they feel best represents their current level of pain and concluded that visual numerical scale provides simple, effective and minimally intrusive measure of pain intensity, which is being used widely in clinical and research setting.

McCormack *et al.*,(1988), emphasized that the reliability and validity of VAS in 32 subjects. It was concluded from the study that VAS provide a simple technique for measuring subjective experience. They have been established as valid and reliable in a range of clinical and research applications.

Section D : Studies on the validity and reliability of Patient – rated wrist evaluation.

Ozturk O *et al*., (2015) conducted a study to evaluate the validity and reliability of the PRWE Scale. The study included 110 patients with connective lesions affecting the wrist. A statistically significant correlation was found between PRWE – T and DASH in the criterion- related validity analysis. The PRWE was found to be valid and reliable and is therefore suggested in evaluating patient-based pain and disability levels in routine clinical practice.

Saurabh Mehta *et al*., (2015) conducted a study to summarize the measurement properties of PRWE Questionnaire. A systemic review of the measurement properties of the PRWE can enhance the understanding of its clinical applicability across different wrist/ hand pathologies. A total of 22 primary studies met

the inclusion criteria. The PRWE is reliable, valid and responsive across many wrist/ hand conditions.

MacDermid JC *et al.*, (1998) conducted a study to develop a valid and reliable tool for quantifying Patient-rated wrist pain and disability. One hundred members of the International wrist investigators were surveyed by mail to assist in development of the scale. Patient opinions on pain and ability to do activities of daily living and work were thought to be the most important dimensions to include in subjective outcome tools. A fifteen- item questionnaire (PRWE) was designed to measure wrist pain and disability. Test-retest reliability was excellent. Validity assessment demonstrated that the instrument detected significant differences over time and was appropriately correlated with alternate forms of assessing parameters of pain and disability.

Methodology

CHAPTER – III

METHODOLOGY

3.1 Study setting

The study was conducted at Out-patient department, RVS College of Physiotherapy.

3.2 Selection of Subjects

30 subjects were selected for the study based upon the Inclusion and Exclusion criteria.

3.3 Variables

3.3.1 Dependent Variables

- Pain
- Wrist function

3.3.2 Independent Variables

- Fascial manipulation

3.4 Measurement tools

Variable	Measurement tool
Pain	VAS
Wrist function	PRWE

3.5 Study design

The study design is and pre and post – test experimental design.

3.6 Inclusion Criteria

- Clinically diagnosed patients with TFCC Strain
- Athletes were included
- Both the sexes were included
- Age-20 to 25 years
- Symptoms for more than a week
- Patients who are willing to participate.

3.7 Exclusion Criteria

- History of wrist pain other than TFCC Strain
- History of wrist fracture
- Any surgery involving the wrist
- Any neurological diseases
- Geriatrics

3.8 Orientation to the patients

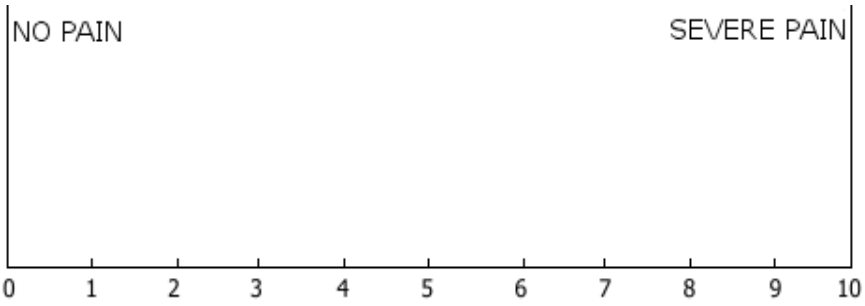
Before the collection of data the subjects were explained about the purpose of the study and procedure to be applied. The investigator had given a detailed orientation to the various treatment procedures such as visual analogue scale to measure pain and function. The concern and full corporation of each participant was sought after

complete explanation of the condition and demonstration of the procedure involved in this study.

3.9. Test Administration

Pain assessment by Visual Analogue Scale

Pain assessment is done by Visual Analogue Scale (VAS). The VAS is a subjective measure of pain. It consists of a 10 cm line with two end-points representing ‘no pain’ and ‘worst pain imaginable’. During the visit, patients are asked to rate their pain by placing a mark on the line corresponding to their current level of pain.



Wrist function Assessment by Patient – Rated Wrist Evaluation

Wrist function is assessed by the PRWE. It is a 15-item questionnaire designed to measure pain and disability in ADL. The PRWE allows the patients to rate their levels of wrist pain and disability from 0 to 10, and consists of two sub-scales.

1. Pain sub-scale : contains 5 itemseach of which is rated from 1 – 10. The maximum score in this section is 50 and minimum 0.

2. Function sub-scale contains total 10 items which are further divided into 2 sections i.e specific activities (having 6 items) and usual activities (having 4 items). The maximum score in this section is 50 and minimu is 0.

There are 3 steps to score PRWE

- Measure the pain score of all 5 items
- Measure the function score of all the 10 items and divide it by 2
- Add the pain and function score

  Total Score = Sum of pain + Function score

  (Best score =0, Worst Score = 100)

3.10 Procedure

Technique

Fascialmanipulation forTFCC Strain

Centre of Perception

Anterior aspect of forearm

Movement Verification

In sitting position the patient is asked to move the wrist against a manual resistance. The difference in strength and pain in moving the wrist is noted.

1) Myofascial unit of Medio Carpus

Centre of co – ordination

Over the Flexor Carpi Ulnaris muscle, in the passage between thr middle and distal third of the forearm.

Treatment

The patient is positioned in prone lying, upper limb intra rotated along the side and palm – up. The therapist stands along the side of the paient and starts moving the knuckle in oblique and transverse direction for 180 seconds.

Figure 2 : Shows treatment of Myofascial Unit of Medio Carpus

2) Myofascial unit of Ante Medio Carpus 1

Centre of fusion

Over the distal 1/3 rd of forearm between Flexor Carpi Ulnaris and Palmaris longus tendon.

Treatment

The patient is positioned in supine lying. The therapist stands along the side of the patient and starts moving the knuckle / elbow in upward direction with medium pressure for 180 seconds.

Figure 3 : Shows treatment of Myofascial Unit of Ante medio Carpus 1

3) Myofascial unit of Ante Medio Carpus 2

Centre of fusion

Between the same tendons closer to the wrist and slightly towards ulna.

Treatment

The patient is positioned in supine lying. The therapist stands along the side of the patient and starts moving the knuckle / elbow in upward direction with medium pressure for 180 seconds.

Figure 4 : Shows treatment of Myofascial Unit of Ante medio Carpus 2

3.11. Collection of data

The selected 20 TFCC Strain patients were treated with fascial manipulation. The treatment was for a period of two weeks. Before and after completion of treatment intervention, pain was evaluated by VAS and wrist function was evaluated by PRWE and then recorded.

3.12. Statistical technique

The collected data were analyzed by paired ‘t’ test to find out significant difference between pre and post-test values of the groups.

Data Analysis & Result

CHAPTER – IV

DATA ANALYSIS AND RESULTS

4.1 Data Analysis

This chapter deals with the systemic presentation of the analyzed data followed by the interpretation of the data

a) Paired 't' test

$$\bar{d} = \frac{\sum d}{n}$$

$$s = \frac{\sqrt{\sum d^2 - \frac{(\sum d)^2}{n}}}{n - 1}$$

$$t = \frac{\bar{d}\sqrt{n}}{s}$$

Where,

d - Difference between pre test and post test values

$\bar{d} = \frac{\sum d}{n}$ Mean difference between pre test and post test values

n - Total number of subjects

s-Standard deviation

Table 1

The table shows mean values, mean difference, standard deviation and paired‘t’ value between pre and post test scores of pain.

Measurement	Mean	Mean Difference	Standard Deviation	Paired ‘t’ Value
Pre test	5.95	1.95	0.15	59.6
Post test	4			

*0.005 level of significance

The calculated paired ‘t’ value is 59.6 and ‘t’ table value is 3.25 at 0.005 level of significance. Hencethe calculated ‘t’ value is greater that ‘t’ value and shows that there is significant difference in pain following Fascial manipulation in TFCC Strain subjects.

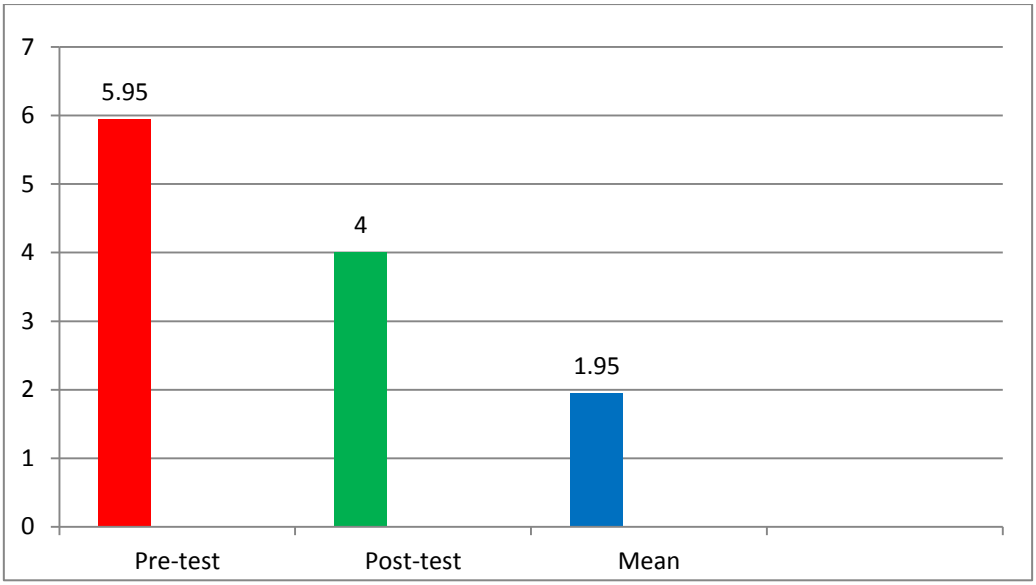


Figure 5: Shows the graphical representation of pre and post test values of Pain.

Table 2

The table shows mean values, mean difference, standard deviation and paired‘t’ value between pre and post test scores of PRWE.

Measurement	Mean	Mean Difference	Standard Deviation	Paired ‘t’ Value
Pre test	232	38	0.32	17.8
Post test	194			

*0.005 level of significance

The calculated paired ‘t’ value is 17.8 and ‘t’ table value is 3.25 at 0.005 level of significance. Hencethe calculated ‘t’ value is greater that ‘t’ value and shows that there is significant difference in Wrist function following Fascial manipulation in TFCC Strain subjects.

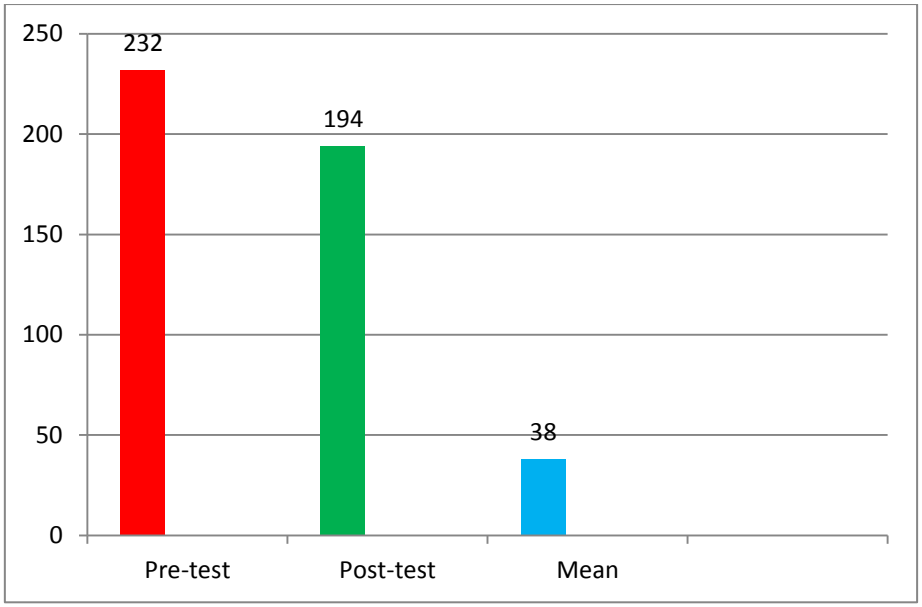


Figure 6: Shows the graphical representation of pre and post test values of PRWE.

4.2 Results

Twenty patients who were athletes, with TFCC Strain were selected for this study. These patients were treated with Fascial manipulation for a period of two weeks. Pain and wrist function were measured before and after the interventions.

Analysis of dependent variable pain : The calculated paired ‘t’ value is 59.6 and the table value is 3.250. Since the calculated ‘t’ value is more than ‘t’ table value there is a significant difference in pain following fascial manipulation among TFCC Strain patients.

Analysis of dependent variable wrist function: The calculated paired ‘t’ value is 17.8 and the table value is 3.250. Since the calculated ‘t’ value is more than ‘t’ table value there is a significant difference in wrist function following Fascial Manipulation among TFCC Strain patients.

Discussion

CHAPTER V

DISCUSSION

Mild injuries of the Triangular Fibrocartilage Complex (TFCC) is referred to as TFCC strain which may be caused either by degeneration / overuse / disuse.So many treatment techniques have been used to relieve the symptoms of TFCC Strain.

The aim the study is to find out the effectiveness of Fascial Manipulation to reduce pain and improve wrist function in TFCC Strain patients. 20 subjects were selected for the study and were treated with Fascial Manipulation.

Results of the present study shows that there is a significant difference in pain and wrist function following Fascial Manipulation in patients with TFCC Strain.

Antonio Stecco*et al*., (2004)conducted a radomized control trial to compare the effectiveness of Fascial Manipulation and Low-Level laser therapy for CTS. The patients were randomly assigned to receive multiple sessions of FM or multiple sessions of LLT. The group that receIved FM showed a significant reduction in subjective pain perception and an increased function assessed by BCTQ at the end of the treatment and follow-up. The group that received LLLT showed an improvement in the BCTQ at the end of the treatment but the improvement level was not sustained at the three month follow-up. FM is a valid alternative treatment for CTS.

By applying the above concepts and support it can be justified that Fascial Manipulation makes a definite difference in patients with TFCC Strain.

Hence the hypothesis 1 & 2 in this study are accepted.

Conclusion

CHAPTER VI

CONCLUSION

This study was conducted to evaluate the Effectiveness of Fascial Manipulation in reducing pain and improving wrist function following TFCCStrain among athletes. Subjects were selected for the study and were given Fascial Manipulation for a period of two weeks. Pain and wrist function were assessed before and after the study using Visual analogue scale and Patient Rated Wrist Evaluation respectively.

From the statistical results it can be concluded that Fascial manipulation is effective in reducing pain and improving wrist function following TFCC Strain.

6.1 Limitations

- The study group was small in size
- The study was limited to age group
- The study did not include follow-up

6.2 Suggestions

- The study can be done with more number of patients
- The study can be conducted for other age groups
- The study can be compared with other treatment like mobilization, taping etc.
- Number of exercises can be increased.

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Annexure

CHAPTER VIII

ANNEXURES

ANNEXURE-I

PHYSIOTHERAPY ASSESSMENT CHART

Subjective examination

Name

Age

Address

Gender

Occupation

Chief complaints

Medical history

Associated problems

Pain assessment

Onset

Side

Site

Duration

Nature

Aggravating factor

Relieving factor

Other if any

Objective examination

On observation

Built

Posture

Attitude of limbs

Muscle wasting

Skin changes

Bony and soft tissue contour

Edema

Gait

Deformity

On palpation

Tenderness

Swelling

Muscle spasm

Warmth

Other if any

On examination

Vital signs

Motor Assessment

Range Of Motion for knee

Movement	AROM	PROM
Flexion		
Extension		

Muscle strength

Investigations

Differential Diagnosis

Provisional Diagnosis

Special tests

ANNEXURE – II

PATIENT – RATED WRIST EVALUATION

1). Pain

At rest	0 1 2 3 4 5 6 7 8 9 10
When doing a task with repeated wrist movements	0 1 2 3 4 5 6 7 8 9 10
When lifting a heavy object	0 1 2 3 4 5 6 7 8 9 10
When it is at its worst	0 1 2 3 4 5 6 7 8 9 10
How often do you have pain	0 1 2 3 4 5 6 7 8 9 10

2) Function

A) Specific Activities

Turn a door knob using my affected hand	0 1 2 3 4 5 6 7 8 9 10
Cut meat using a knife in my affected hand	0 1 2 3 4 5 6 7 8 9 10
Fasten buttons on my shirt	0 1 2 3 4 5 6 7 8 9 10
Use my affected hand to push up from a chair	0 1 2 3 4 5 6 7 8 9 10
Carry a 10lb object in my affected hand	0 1 2 3 4 5 6 7 8 9 10
Use bathroom tissue with my affected hand	0 1 2 3 4 5 6 7 8 9 10

B) Usual Activities

Personal care activities (Dressing, Washing)	0 1 2 3 4 5 6 7 8 9 10
Household work (Cleaning, Maintenance)	0 1 2 3 4 5 6 7 8 9 10

Work (Your job or everyday work)	0 1 2 3 4 5 6 7 8 9 10
Recreational Activities	0 1 2 3 4 5 6 7 8 9 10

ANNEXURE-III

Table 3-Master chart, Pre and Post test values of Visual analogue Scale`

SL NO.	PRE TEST	POST TEST
1	7	5
2	6	3
3	8	7
4	6	4
5	8	6
6	7	5
7	6	3
8	6	4
9	5	2
10	3	2
11	4	2
12	6	4
13	7	4
14	8	7
15	6	3
16	6	4
17	5	3
18	4	3
19	4	2
20	5	4

ANNEXURE-IV

Table 3-Master chart, Pre and Post test values of PRWE

SL NO.	PRE TEST	POST TEST
1	11	10
2	12	11
3	10	9
4	15	13
5	13	12
6	11	9
7	11	10
8	12	11
9	13	12
10	14	13
11	12	11
12	12	10
13	13	12
14	11	10
15	10	9
16	10	8
17	9	8
18	9	7
19	12	11
20	12	10

ANNEXURE-V

Special Tests

- **TFCC Compression test**

  Patient position- Sitting

  Therapist position- Standing by the side of the patient.

  Procedure- The examiner deviates the wrist on ulnar side with forearm in neutral

  Implication- The positive sign on this test indicates pain /clicking on the wrist.

- **TFCC Stress Test**

  Patient position- Sitting

  Therapist position- Standing by the side of the patient.

  Procedure – The patient has the wrist in ulnar deviation while applying a shear force across the ulnar complex of the wrist

  Implications- The sign of this test is increase in pain in the wrist.

ANNEXURE-VI

PATIENT CONSENT FORM

I…….Voluntarily consent to participate in the research named on **"A STUDY ON THE EFFECTIVENESS OF FASCIAL MANIPULATION IN REDUCING PAIN AND IMPROVING WRIST FUNCTION FOLLOWING TFCC STRAIN AMONG ATHLETES."**

The researcher has explained me the treatment approach in brief, risk of participation and has answered the questions related to the study to my satisfaction.

Signature of Patient **Signature of Researcher**

Signature of Witness

Place:

Date: